Virtual Tailor: Hire an Online Tailor for Custom Stitching as a Service using Augmented Reality

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Abstract

In this digital age, the way we live is changing and so is the way we relate to fashion. We are becoming more conscious about what's good for us, and our clothes are now an extension of our unique personality. Tailoring is not just meant with stitching and sewing few fabrics together, but it is an art. The art which can make a simple fabric turn into something very special and that too, according to your choice and style. Tailored stuff offers a classic look whether for men or women. It gives a sense of sophistication. That's why Ladies Tailor or Men's Tailor, all are in high demand these days & the option of hiring online tailor is something to be researched with passion. Virtual Tailor is an online tailor web application at your doorstep for stitching the custom-made clothes. Virtual Tailor is an augmented reality-based interactive platform that can be used for bespoke clothing requirements. Hire the most talented professionals for stitching garments. Virtual Tailor is an online 3D design engine that provides a novel online tailor store experience to you and the customers. It helps you select Cuffs, Collars, Plackets, Lapels, Fits and so much more. Avail a step-by-step guide to body measuring or pick up a standard size. Or simply choose from previously saved personal measurements for a made-to-measure finish. The configurator enables combining the selected elements, and the garment is instantly visualized in a made-to-measure outfit of your choice. The design will be send to you for approval. Upon approval and payment confirmation, the design will be sent for production. View the 3D image of your tailored suit being developed in real time using augmented reality. Place tailoring orders and get your custom-made shirts and custom tailor suits without stepping into a shop. 3D design tailor engine with a comprehensive design and feature database for made-to-measure suits. This virtual tailor combines the configurator, measurement module and payment gateway. It enables e-commerce for your online tailor store as well. Based on augmented reality try on, this virtual dressing empowers the customer with a Virtual Trial Room.

I. INTRODUCTION

Image-based virtual try-on (VTON) systems based on deep learning have attracted research and commercial interests. Although they show their strengths in blending the person and try-on clothing image and synthesizing the dis-occluded regions, their results for complex-posed persons are often unsatisfactory due to the limitations in their geometry deformation and texture-preserving capacity. To address these challenges, we propose CloTH-VTON+ for seamlessly integrating the image-based deep learning methods and the strength of the 3D model in shape deformation. Specifically, a fully automatic pipeline is developed for 3D clothing model reconstruction and deformation using a reference human model: first, the try-on clothing is matched to the target clothing regions in the simple shaped reference human model, and then the 3D clothing model is reconstructed. The reconstructed 3D clothing model can generate a very natural pose and shape transfer, retaining the textures of clothes. A clothing refinement network further refines the alignment, eliminating the misalignment due to the errors in human pose estimation and 3D deformation. The deformed clothing images are combined utilizing conditional generative networks to in-paint the dis-occluded areas and blend them all. Experiments on an existing benchmark dataset demonstrate that CloTH-VTON+ generates higher quality results in comparison to the state-of-the-art VTON systems and CloTH-VTON. CloTH-VTON+ can be incorporated into extended applications such as multi-pose guided and Video VTON. Compared to traditional offline shopping, the growing online society has found online apparel shopping to have better commercial advantages in terms of time, choice, and price. Virtual try-on (VTON) systems enable

users to try on clothes and check the size or style without the physical presence of clothing. Image-based virtual try-on systems have been attracting research and industrial interest because they do not need 3D information of the human and the clothing. The 3D modeling of clothing and humans requires a big amount of manual labour or expensive devices to collect the necessary information. The common image-based virtual try-on scenarios assume one in-shop/retail clothing image and an image of the reference/input human/person as their inputs. We specify the input (target) in-shop/retail clothing as in the try-on clothing and the reference person/human as the input person for the later uses. Generally, virtual try-on systems require two major image processing tasks: in-shop try-on clothing warping according to the input person image, and blending/inpainting the dis-occluded human area according to the change of clothing

II. LITERATURE REVIEW

All three neural networks in our approach, SGN (Sec. III-A), PGN (Sec. III-E1), and TFN (Sec III-E2) share the common network architecture: U-Net as the generators and the discriminators from Pix2PixHD network. GAN losses include the generator loss, discriminator losses for real and fake outputs, and the feature-matching loss. All networks are implemented in PyTorch, based on the public implementation of ACGPN [5]. Except for SGN, each network is trained for 20 epochs with a batch size of 8, taking 17-20 hours of training for each network with 4 TITAN Xp GPUs. SGN is trained for 200 epochs. For testing, we used two settings of VITON test input pairs - paired and unpaired. Paired setting means where the input try-on clothing is the same as the clothing on the input person, which is used for evaluating with the ground-truth, e.g., quantitative evaluation and ablation study in this paper. Unpaired setting denotes where the try-on clothing is different from the clothing on the input person, similar to the real-world scenario, which is used for visual comparison, e.g., qualitative analysis and user study in our paper. We use the fully-automatic process to generate a specific matching mask for each cloth. Direct inference with the SGN network gives several unexpected results when we test with the standard A-posed model input. We assume that since the network is trained with the full training set which is full of various poses and is different from A-pose, artifacts resulted. It would be best to train simple networks with fixed A-pose data, but due to the lack of such data and annotations, we choose to go with a closer path. We collected 1,095 human images with very simple poses (e.g., straight hands and standing) from the VITON data set.

III. QUANTITATIVE ANALYSIS

the quantitative comparison among the image-based virtual try-on approaches along with CloTH-VTON+, based on several performance evaluation metrics the Structural Similarity, Multi-Scale Structural Similarity (MS-SSIM), Inception Score (IS), Learned Perceptual Image Patch Similarity (LPIPS), and Frechet Inception DistanceExcept for IS, all of the metrics are evaluated against the ground truth (i.e. in the paired setting where the try-on clothing and the clothing on the input person are the same evaluated in the unpaired setting where the try-on clothing is different from the clothing on the input person, similar to the real-world scenario. SSIM, MS-SSIM, LPIPS, and FID scores are compared between the try-on results and their corresponding input person images (i.e. the ground truth). For SSIM, MS-SSIM, and IS, the higher the scores, the better the results. Since LPIPS and FID are distance measures, they indicate better results with lower scores. According to the evaluated scores, we can see that CloTH-VTON+ scored the best in SSIM, MS-SSIM, LPIPS, and FID evaluations. This reveals the supremacy of our proposed approach over the SOTA methods.

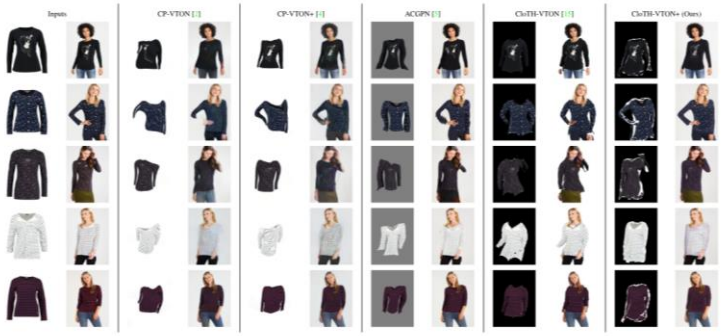

FIGURE 29. Visual comparison of results from the SOTA methods and CloTH-VTON+ on same-clothed inputs as in the paired setting. to compare the try-on result with ground truth. The leftmost column consists of the try-on clothing and input person (also ground-truth). Rest of the columns from left to right include warped clothing and try-on results from CP-VTON [2], CP-VTON+ [4], ACGPN [5], CloTH-VTON [15], and our CloTH-VTON+ respectively.

VITON fails to retain the person representation and non-target areas. CP-VTON produces blur results and cannot preserve the details correctly. CP-VTON+ can preserve the clothing shape and details to some extent but loses quality in overall results. ACGPN produces better results among SOTA methods while having issues in preserving texture details in some cases. All of the previous methods perform poorly in clothing deformations. CloTH-VTON deforms the clothes well but it has many pixel misalignment issues. CloTH-VTON+ generates the most competitive results while preserving the correct input details.

IV. CONCLUSION

In this paper, we proposed CloTH-VTON+, a fully automatic end-to-end hybrid image-based virtual try-on (VTON) for fashion clothing. Our earlier work, CloTH-VTON, had proposed a 3D clothing reconstruction method from a single clothing image for applying 3D deformation to it. On top of the baseline of CloTH-VTON, we developed a fully automatic pipeline for 3D clothing reconstruction from a single image through the target clothing segmentation region generated by the proposed segmentation generation network, The experiments with the VITON dataset demonstrated that CloTH-VTON+ handles virtual try-on cases for diversely posed input persons with long-sleeve try-on clothing better than the previous 2D methods. Even though we focus on the given/fixed pose VTON application, the core clothing deformation method can be applied to multi-pose and video VTON applications too. However, we admit that the application range of the proposed clothing 3D reconstruction and deformation method is still limited to rather simpler and tighter clothing. Hence, the next step of this study will be to extend our method to the loose or/and complicated multi-layer outfits. Also, in this paper, we focus on a hybrid approach to combine the strengths of the neural networks and computer graphics technologies; we believe, though, that the emerging graph neural network technology could integrate both technologies in a unified domain.

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